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FISH 558

Homework 3

Question A1

A picture containing diagram

Description automatically generated

Question A5

Graphical user interface, chart, histogram

Description automatically generated

Histograms of the post-model, pre-data distributions for the four parameters in the whale population model.

Chart, histogram

Description automatically generated

Histograms of the posterior distributions for the four parameters in the whale population model. Including the priors appears to have improved our estimates of S+1 and K+1.

Chart, line chart, histogram

Description automatically generated

Population trajectory for N+1 bowhead whales, from 1848 to 2002.

Part B

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Annual Catch | 2003 (1+) Population Size | | | Expected Value |
| < 7000  (0.27) | 7000 ≤ P ≤ 8000  (0.51) | > 8000  (0.22) |
| 67 | 0.963 | 1 | 1 | 0.99 |
| 134 | 0.389 | 0.912 | 1 | 0.79 |
| 201 | 0.037 | 0.451 | 1 | 0.46 |

Since we are interested in a sustainable harvest of bowhead whales comparing the population size at the onset of a harvest rule and at a point in the future makes sense. Ideally, we do not what to see the population decline. The problem of comparing only two years is that there is stochasticity within the bowhead whale population, which this performance measure cannot capture. Some better performance measures include the probability the bowhead stock dips below a threshold value or the trend of the population over the time frame of interest. Both performance measures can account for variations in reproduction and survival year-to-year.